

INCH-POUND  
MIL-PRF-23648/19C  
28 September 2001  
SUPERSEDING  
MIL-R-23648/19B  
4 April 1995

## PERFORMANCE SPECIFICATION

### RESISTOR, THERMAL (THERMISTOR), HERMETICALLY SEALED, POSITIVE TEMPERATURE COEFFICIENT, STYLE RTH42

This specification is approved for use by all Departments and Agencies of the Department of Defense.

#### 1. SCOPE

1.1 Scope. This specification covers the detail requirements for style RTH42 thermistors. This style is available in resistance ratio E only. Terminal leads type S and W are available. Resistance tolerance versus temperature characteristics G, J, and K are applicable through the maximum temperature of 125°C.

#### 2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3 and 4 of this specification. This section does not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements documents cited in sections 3 and 4 of this specification, whether or not they are listed.

##### 2.2 Government documents.

2.2.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DoDISS) and supplement thereto, cited in the solicitation (see 6.2).

#### SPECIFICATION

##### DEPARTMENT OF DEFENSE

MIL-PRF-23648 - Resistor, Thermal (Thermistor), Insulated, General Specification For.

(Unless otherwise indicated, copies of the above specifications, standards, and handbooks are available from the Document Automation and Production Service, Building 4D, (DPM-DODSSP), 700 Robbins Avenue, Philadelphia, PA 19111-5094.)

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Defense Supply Center, Columbus, ATTN: DSCC-VAT, P.O. 3990, Columbus, Ohio, 43216-5000, by using the Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

2.3 Order of precedence. In the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

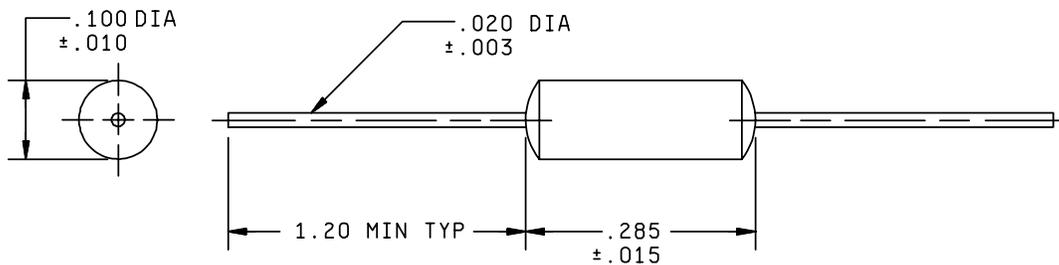
3.1 Requirements. Requirements shall be in accordance with MIL-PRF-23648, and as specified herein.

3.2 Interface and physical dimensions. The thermistors shall meet the interface and physical dimensions as specified on figure 1 and herein.

3.3 Thermal time constant. The thermal time constant shall be 60 seconds maximum.

3.4 Dissipation constant. The dissipation constant shall be 2.5 milliwatts per degrees Celsius minimum.

3.5 Power rating. The thermistor shall be capable of dissipating a maximum power of 0.25 watts at 25°C. Thermistors shall be derated in accordance with figure 2.



Inch	mm
0.003	0.08
0.010	0.25
0.015	0.38
0.020	0.51
0.100	2.54
0.285	7.24
1.20	30.48

NOTES:

1. Dimensions are in inches.
2. Metric equivalents are given for general information only.

FIGURE 1. Style RTH42 thermistors.

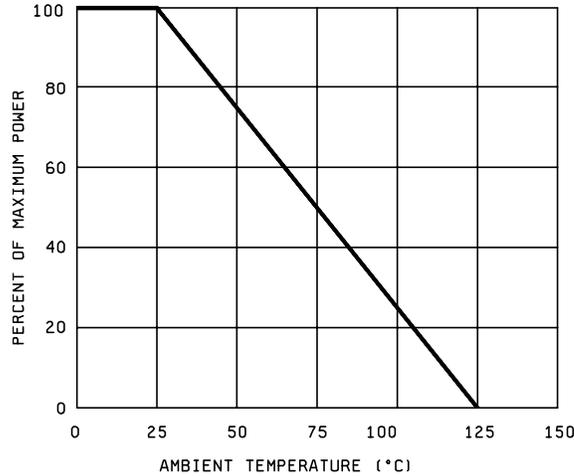


FIGURE 2. Derating curve for high ambient temperatures.

3.6 Resistance.

3.6.1 Resistance at 25°C. Standard values shall be as specified in MIL-PRF-23648 except that the 5 percent decade values shall also be used for resistance tolerance G. Minimum and maximum resistance values shall be in accordance with table I.

TABLE I. Minimum and maximum resistance values (at 25°C).

Ratio 0.55 (E)
<u>Ohms</u>  10 min 10 k max

3.6.2 Resistance at temperatures other than 25°C. Factors for determining resistance at temperatures other than 25°C are in accordance with table II. The appropriate factor is selected from the column headed by the resistance range which includes the zero-power 25°C resistance of the thermistor in question. The 25°C resistance of the thermistor is multiplied by the factor selected to obtain the resistance at any given temperature.

Example: Given a thermistor with a 25°C resistance of 220 ohms, find the resistance at 75°C. Select the factor opposite 75°C from the column headed by the resistance range containing 220 ohms. The factor 1.400 is thus selected from the column headed 180-470. Multiply 220 ohms by the factor 1.400 to obtain the resistance at 75°C of 308 ohms.

TABLE II. Factors for determining resistance at various temperatures.

Temperature (°C)	Resistance range (ohms)					
	10-75	82-160	180-510	560-1.3k	1.5k 6.2k	6.8k-10k
-55	0.615	0.582	0.560	0.550	0.515	0.510
-15	0.790	0.770	0.755	0.740	0.730	0.730
0	0.863	0.847	0.838	0.835	0.825	0.825
25	1.0	1.0	1.0	1.0	1.0	1.0
50	1.160	1.170	1.180	1.20	1.230	1.190
75	1.350	1.370	1.400	1.420	1.450	1.400
100	1.545	1.584	1.623	1.656	1.670	1.610
125	1.750	1.80	1.860	1.920	1.960	1.830

3.7 Short time overload. The maximum allowable change in zero-power resistance as the result of the short time load test shall be  $\pm 2$  percent.

3.8 Low temperature storage. The maximum allowable change in zero-power resistance as the result of the low temperature storage test shall be  $\pm 2$  percent.

3.9 High temperature storage. The maximum allowable change in zero-power resistance as the result of the high temperature storage test shall be  $\pm 1$  percent.

3.10 Terminal strength. When tested in accordance with 4.2, the maximum allowable change in zero-power resistance shall be  $\pm 1$  percent.

3.11 Thermal shock. The maximum allowable change in zero-power resistance as the result of the thermal shock test shall be  $\pm 2$  percent.

3.12 Resistance to soldering heat, type S. The maximum allowable change in zero-power resistance as the result of the resistance to soldering heat test shall be  $\pm 1$  percent.

3.13 Moisture resistance. The maximum allowable change in zero-power resistance as the result of the moisture resistance test shall be  $\pm 3$  percent.

3.14 Life. The maximum allowable change in zero-power resistance as the result of the life test shall be  $\pm 5$  percent.

3.15 High temperature exposure. The maximum allowable change in zero-power resistance as the result of the high temperature exposure test shall be  $\pm 1$  percent after 100 hours, and  $\pm 2$  percent after 1,000 hours.

3.16 Vibration, high frequency. The maximum allowable change in zero-power resistance as the result of the vibration test shall be  $\pm 2$  percent.

3.17 Shock, specified pulse. The maximum allowable change in zero-power resistance as the result of the shock test shall be  $\pm 2$  percent.

3.18 Seal. When tested in accordance with 4.5, the maximum allowable leakage rate shall be  $1 \times 10^{-7}$  atmospheric cubic centimeters per second (atm cc/sec). For the purpose of this specification, a hermetically sealed thermistor is one which is capable of passing the seal test of 4.5. Enclosure materials shall be ceramic, metal, or glass, or combinations thereof.

3.19 Immersion. The maximum allowable change in zero-power resistance as the result of the immersion test shall be  $\pm 3$  percent.

3.20 Resistance to solvents. There shall be no evidence of mechanical damage to the body and the marking shall remain clear and legible.

3.21 Marking. The thermistors shall be marked in accordance with MIL-PRF-23648.

#### 4. VERIFICATION

4.1 Sampling and inspection. Sampling and inspection shall be in accordance with MIL-PRF-23648.

4.1.1 Qualification seal test. The seal test specified in 4.5 shall be performed prior to the immersion testing of MIL-PRF-23648, table III, group VI.

4.1.2 Semiannual seal test. The seal test specified in 4.5 shall be performed prior to the immersion test of MIL-PRF-23648, table VI.

4.2 Terminal strength.

4.2.1 Direct load. Direct load shall be applied gradually until the load reaches 4.5 pounds.

4.3 Solderability (type S leads). The solderability test is applicable to this specification for the type S leads.

4.4 Resistance to soldering heat (type S leads). The resistance to soldering heat test is applicable to this specification.

4.5 Seal. Thermistors shall be tested in accordance with method 112 of MIL-STD-202. The following details shall apply.

- a. Test condition: C, procedure III.
- b. After test: Thermistors shall be cleaned in alcohol or other suitable degreaser, and allowed to dry thoroughly.

#### 5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When actual packaging of material is to be performed by DoD personnel, these personnel need to contact the responsible packaging activity to ascertain requisite packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activity within the Military Department or Defense Agency, or within the Military Department's System Command. Packaging data retrieval is available from the managing Military Departments or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

6.1 Intended use. The notes specified in MIL-PRF-23648 are applicable to this specification.

6.2 Acquisition requirements. Acquisition documents must specify the following:

- a. Title, number, and date of the specification.
- b. Issue of DoDISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.2.1).
- c. Packaging requirements (see 5.1).

6.3 Changes from previous issue. Marginal notations are not used in this revision to identify changes with respect to the previous issue due to the extensiveness of the change.

Custodians:

Army - CR  
Navy - EC  
Air Force - 11  
NASA - NA  
DLA - CC

Preparing activity:  
DLA - CC

(Project 5905-1623-03)

Review activities:

Army - AR, AT, AV  
Navy - AS, CG, MC, OS  
Air Force - 19

**STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL**

**INSTRUCTIONS**

1. The preparing activity must complete blocks 1, 2, 3, and 8. In block 1, both the document number and revision letter should be given.
2. The submitter of this form must complete blocks 4, 5, 6, and 7, and send to preparing activity.
3. The preparing activity must provide a reply within 30 days from receipt of the form.

NOTE: This form may not be used to request copies of documents, nor to request waivers, or clarification of requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements.

<b>I RECOMMEND A CHANGE:</b>		<b>1. DOCUMENT NUMBER</b> MIL-PRF-23648/19C	<b>2. DOCUMENT DATE (YYMMDD)</b> 2001 September 28
<b>3. DOCUMENT TITLE</b> RESISTOR, THERMAL (THERMISTOR), INSULATED, POSITIVE TEMPERATURE COEFFICIENT, STYLE RTH42			
<b>4. NATURE OF CHANGE</b> (Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)			
<b>5. REASON FOR RECOMMENDATION</b>			
<b>6. SUBMITTER</b>			
a. NAME (Last, First, Middle initial)		b. ORGANIZATION	
c. ADDRESS (Include Zip Code)		d. TELEPHONE (Incl Area Code) (1) Commercial (2) DSN (If applicable)	7. DATE SUBMITTED (YYYYMMDD)
<b>8. PREPARING ACTIVITY</b>			
a. NAME Defense Supply Center, Columbus ATTN: DSCC – VAT		b. TELEPHONE (Include Area Code) (1) Commercial (614) 692-0553 (2) DSN 850-0553	
c. ADDRESS (Include Zip Code)  P.O. 3990 Columbus, OH 43216-5000		<b>IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT:</b> Defense Standardization Program Office (DLSC-LM) 8725 John J. Kingman Road, Suite 2533 Fort Belvoir, Virginia 22060-6221 Telephone (703) 767-6888 DSN 427-6888	